PS 79-60 - Agri-environmental schemes: Conserving and improving habitat quality in Mediterranean farmland ecosystems

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Background/Question/Methods

Farmland ecosystems are severely threatened due to agricultural intensification which contributes to a significant loss of biodiversity. Farmland and steppe birds are particularly vulnerable species linked to these ecosystems and are the most threatened bird group, with 83% of the species subject to unfavourable status. Agri-environmental schemes (AES) are today considered the most important instruments to counteract the negative effects of intensive agriculture. However, their effectiveness seems to be highly variable between studies, localities and organism groups, making it difficult to assess their benefits. Most of these studies have been carried out at mid- or high latitudes of the northern hemisphere, and very few in the Mediterranean region.

Are AES effective against agricultural intensification in central Spain? Do AES improve habitat quality? How do AES influence steppe birds?

Since 2001, an AES program is being carried out in a Special Protection Area for birds (SPA 139) in central Spain. The great bustard was used as indicator species to study bird responses to AES. The great bustard *Otis tarda* L. is a large steppe bird which has suffered marked declines during the last decades and today is considered Globally Threatened. Males and females aggregate at *leks* for mating. Bustards were counted during winter and spring (2001-2010) in five experimental *leks* (with AES) and three control *leks* (without AES). We computed an index of agricultural intensification as percentage of surface engaged to cereal crop and ploughed land. Availability of plants and arthropods was estimated in 328 cereal fields, legumes, stubbles, ploughed fields, fallows, and borders between cultivated fields in areas with and without AES.

Results/Conclusions

The abundance of bustards increased at experimental leks in winter and spring, whereas control leks did not show significant changes. Fallows, borders and legume fields had significantly more diversity, abundance and biomass of arthropod and plants. The agricultural intensification index was significantly reduced in areas with AES. These areas also showed higher food availability than areas without AES.

Agri-environment schemes counteracted the negative impact of agricultural intensification. In this context, it improved habitat quality by providing increased food availability. AES may thus contribute to preserve threatened steppe-birds living in Mediterranean dryland farmland areas.

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Agri-environmental schemes:
Conserving and improving habitat quality in Mediterranean farmland ecosystems

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INTRODUCTION

Farmland ecosystems are severely threatened due to agricultural intensification which contributes to a significant loss of biodiversity. Farmland and steppe birds are particularly vulnerable species linked to these ecosystems. This is the most threatened bird group, with 83% of the species subjected to unfavourable status.

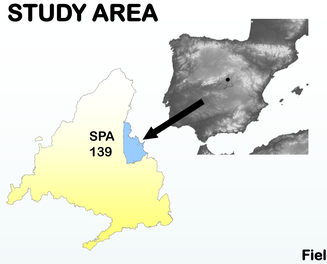
Agri-environmental schemes (AES) are today considered the most important instruments to counteract the negative effects of intensive agriculture. However, their effectiveness seems to be highly variable between studies, localities and organism groups, making it difficult to assess their benefits. Most of these studies have been carried out at mid- or high latitudes of the northern hemisphere, and very few in the Mediterranean region.

The great bustard *Otis tarda* L. was used as model species to study bird responses to AES. It is a large steppe bird that has suffered marked declines during the last decades and today is considered Globally Threatened. Males and females aggregate at *leks* for mating.

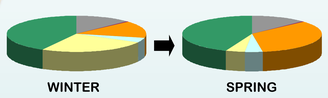
OBJETIVE

To assess the effectiveness of agri-environmental schemes (AES) against agricultural intensification in central Spain and how it influences great bustard distribution

STUDY AREA



% surface of field types



Field types
- Fallow
- Edges
- Plough
- Legume
- Stubble
- Cereal

Since 2001, an AES program is being carried out in a Special Protection Area for birds (SPA 139) in central Spain. Each year, about 400 ha are included in this program.

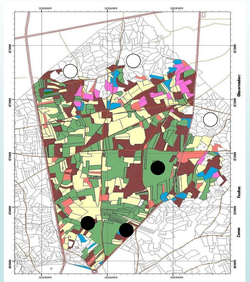
Agri-environmental scheme (AES) measures	
Stubbles	Farmers don't work the land for an agricultural cycle, they can only plow the land from January 1 to April 1
Fallows	Fields are removed from production for five years. Famers don't work the land for that period.
Legumes	Fields are sown with legumes (*Vicia* sp), they cannot be harvested until July 10

METHODS

Agri-environmental schemes (AES) and bustards

Bustards were counted during winter, mating and breeding season (2005-2010). At the bustard's distribution area, we generated 200 m buffer around centroids of fields with AES and around random points without AES. We calculated the mean number of birds within buffer with and without AES using GIS.

Buffer 200 m with AES
Random buffer 200 m



Food availability

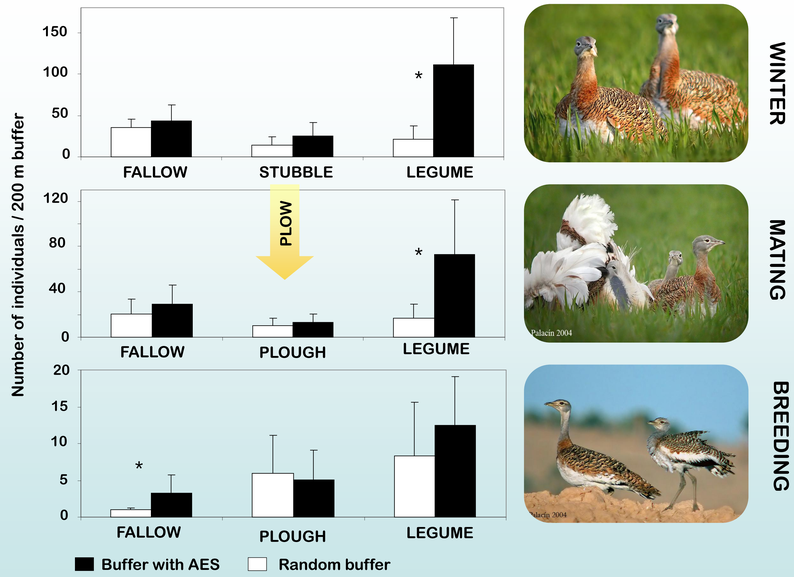
Availability of plants and arthropods was estimated in 328 fields (cereal fields, legumes, stubbles, ploughed fields, fallows, and edges between fields).

Agricultural intensification

We calculated the intensification level (sums of % surface of cereal sown and plough minus surface of edges) in 1999 (before AES) and 2007 (after AES) and how the amount of arthropod biomass available changed between both years, % surface of differents field types of 1999 were compared to % surfaces 2007.

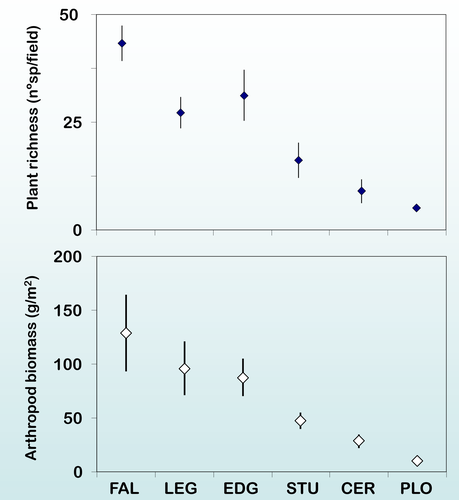
RESULTS

Agri-environmental schemes and bustards



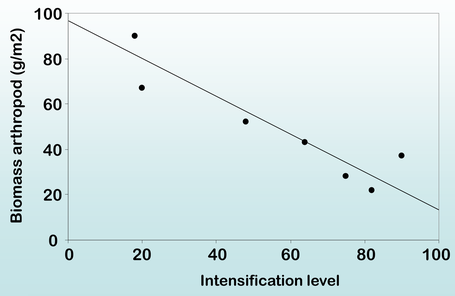
Legume fields were used significantly more than expected during winter and mating season ($p<0.05$). Fallow fields were used significantly more only during the breeding season. In contrast, stubble fields were not used more often than expected.

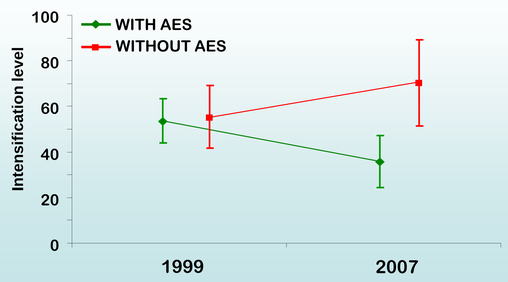
Food availability



Fallows, legumes and edges between fields are significantly more rich and abundant in plants and arthropods than other field type ($p<0,05$). Ploughs and cereal fields are significantly less rich and abundant.

Agricultural intensification





The intensification level significantly decreased the available invertebrate biomass ($rs = -0.854$, $p < 0.05$).

Areas with AES decreased the agricultural intensification level, but not significantly.

CONCLUSIONS

Fields under agri-environmental schemes (especially legumes) were used by bustards more than expected. Fallows were also well preferred by bustards, especially during the breeding season. These fields are a good a shelter and food source. In fact, fallows and legumes were particularly rich in plants and arthropods.

Agri-environment schemes counteracted the negative impact of agricultural intensification. In this context AES improved habitat quality by providing increased food availability. AES may thus contribute to preserve threatened steppe-birds living in Mediterranean dryland agricultural areas.

Acknowledgements
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